Space Weather Forecast

Issued on Friday 4 October 2024 at 13:30 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares expected, chance of isolated Strong flares. Minor-Moderate Geomagnetic storms likely, Chance Strong Geomagnetic storm Days 2 and 3 (05-06 Oct).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High, with the background level solar activity just below Moderate Class level and numerous M-class flares occurring. The largest flare was a Strong flare observed at 03/1218 UTC, which originated from a geomagnetically complex region near south-centre disc.

There are currently eleven active sunspot regions on the Earth-facing disc. The two most complex regions are located in the southwest quadrant. One of these regions was responsible for the aforementioned Strong flare, and a previous Strong flare on 01 Oct. This region shows significant magnetic complexity and frequent flare activity. The other region, although slightly smaller, is also magnetically complex. The largest region lies close to the northeast limb, but exact classification remains difficult due to its viewing angle. Another region also tricky to analyse, due to its proximity to the east limb, is a new region that appears to have the potential to be magnetically complex. The remaining regions are smaller and appear relatively benign, although one other region in the southwest produced a Moderate flare on 03 Oct and cannot be discounted from producing further significant flares.

The Strong flare from 03 Oct produced a Coronal Mass Ejection (CME) that is forecast to reach Earth later on Day 2 (05 Oct) or during early Day 3 (06 Oct). Further CMEs evident on coronagraph imagery from early 04 Oct may also have had Earth-directed components, analysis of these features are underway.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of a slow regime. Solar wind speeds ranged between approximately 310 and 390 km/s. The Interplanetary Magnetic Field remained mostly at weak levels, only briefly touching moderate levels. The north-south component also remained at weak values. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles remained at background levels with no solar radiation storms observed.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 370 900 0100 Email: enquiries@metoffice.gov.uk

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Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Moderate, with further Moderate class flares expected and a chance of isolated Strong flares occurring, these most likely originating from the complex regions in the southwest.

Solar Wind / Geomagnetic Activity: A glancing blow from a CME from the 01 Oct is likely later Day 1 or 2 (04-05 Oct). The arrival of another CME, from 03 Oct, is more confident,, arriving either late on the Day 2 or during Day 3 (06 Oct). One or more further CME arrivals are possible Day 4 (07 Oct) following filament disruptions and flaring observed late 03 and during 04 Oct, but analysis of these features is ongoing. A filament eruption (arc of plasma material) was observed 03/0630 UTC in coronagraph imagery, close to a sunspot region located near the northeast limb. This has produced a coronal mass ejection (CME) off the northeast limb, which has been analysed as missing Earth.

Solar wind speeds are expected to remain close to background levels initially, rising upon arrival of the first CME to 400-450km/s. A more substantial rise in wind speeds is possible with the combined effects of CME arrivals later Day 2 or Day 3, likely reaching Elevated levels with a slight chance of Strong levels (600-650 km/s). Speeds are then expected to gradually decline as enhancement from these arrivals wanes.

Quiet geomagnetic conditions are expected at first, increasing G1-G2/Minor to Moderate Geomagnetic storm levels (Kp 5-6) at times from late today or early tomorrow and through the rest of the period, due to the forecast arrival of CMEs. There is also a chance of G3/Strong geomagnetic storm (Kp 7) conditions occurring, mainly from late on Day 2 (5 Oct) into Day 3 (6 Oct), with a slight chance of isolated G4/Severe Geomagnetic storm (Kp 8) intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles is forecast to persist at background levels, with a slight chance of rising above should further notable flares occur during the forecast period.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	50	80	80	60
Strong	**G3**	No	5	50	50	5
Severe	**G4**	No	1	20	20	1
Extreme	**G5**	No	1	5	5	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	85	85	85	85
Very Active	R3-R5 (X Class)	Yes	35	35	35	35

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	25	25	25	25
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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